Special issue: Highlights from the flagship Latin American Symposium on Circuits and Systems: selected papers from LASCAS 2013

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It is a pleasure and a privilege to present to the readers of the Springer Journal on Analog Integrated Circuits and Signal Processing (ALOG) a selection of the papers from the 4th edition of the Latin America Symposium on Circuits and Systems—LASCAS 2013, held in February 2013 in the historical Peruvian city of Cuzco.

The LASCAS Symposium is the premier event in circuits and systems in that region of the Americas. The papers selected by the Guest Editors fall in the focus of this Journal, and are among the 10 % top quality of the 155 papers submitted to LASCAS 2013, and were selected by rigorous reviewing. While LASCAS contemplates applications and digital systems, most of the papers in this Special Issue address analog circuits and systems, the themes of interest to ALOG Journal readers.

From the 119 papers which were accepted and published in the IEEE LASCAS Proceedings, a total of 27 works were nominated and invited to submit a substantially improved manuscript on the same subject to this Special

Issue of LASCAS 2013. The quality screening took advantage of the reviews and paper ratings for each of those 119 papers, which were narrowed down to 23 extended manuscripts. These went through a second-round of peer-review process and 14 papers, substantially extended versions from the LASCAS Symposium, were finally selected for this Special Issue, as the highlights from the flagship Latin American Symposium on Circuits and Systems. The papers in this Special Issue come from the Americas (North and South) and Europe.

The 14 selected papers cover a wide range of topics, from analog circuits design at ultra-low voltages, to amplifiers design, integrated circuits, wireless, and digital systems design, and up to topics at the application of communications and arithmetic circuits.

The first 3 papers in the Special Issue deal with low voltage analog CMOS design. The paper “*Fully Integrated Inductive Ring Oscillators Operating at VDD below $2kT/q$* ” by M. Machado *et al* presents oscillators with two inductive loading schemes to work under extremely low DC supplies. H. Hernandez *et al* propose and show in their paper a silicon implementation of “*A fully Integrated Boost Converter For Thermoelectric Energy Harvesting*” which upconverts from very low voltage supplies. The paper “*Sub-1 V Band-Gap Based and MOS Threshold-Voltage Based Voltage References in 0.13 μm CMOS*” by D.M. Colombo *et al* explores and compares low-voltage DC reference circuits with different circuit approaches possible in standard CMOS, compared to diode-based BGRs. Two papers on DC and instrumentation amplifiers designs target improvements on either DC gain or CMRR. H. Gomez-Ortiz introduces a “*Robust to PVT Enhanced DC Gain Amplifier Using No Miller Capacitor Feedforward Compensation*” in his paper, where a feedforward scheme improves DC gain and common mode range.

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Authors R. Abdullah and E. Sanchez-Sinencio in their paper on “*A Biopotential Amplifier with Dynamic Capacitor Matching for Improved CMRR*” demonstrate advances in techniques for dynamic matching to input in instrumentation amplifiers. The paper “*A Configurable Analog Buffer Dedicated to a Wafer-Scale Prototyping Platform*” by Y. Laflamme-Mayer *et alli* demonstrates in silicon the design of an analog buffer for digital systems that presents a degree of performance configuration. M.J. Barragan *et alli* present a low-overhead, programmable and low power on-chip harmonic signal generator with low distortion in their paper “*On-Chip Sinusoidal Signal Generation with Harmonic Cancellation for Analog and Mixed-Signal BIST Applications*”. Circuits for wireless communications are focused in 3 papers in this Special Issue: in the work on “*Very Small Inductorless 2nd Derivative Gaussian IR-UWB Transmitter Module Using n/p-Latches as PDs*” the authors L.C. Moreira *et alli* show the circuits for pulse shaping necessary in ultra-wideband transmitters. An integrated Doherty RF power amplifier design for constant power-added efficiency is demonstrated by M. L. Carneiro *et alli* in their paper “*Fully Integrated Doherty Power Amplifier in CMOS 65 nm with Constant PAE in Backoff*”. Wireless communication systems design is also featured in this issue: co-authors J. Gaxiola-Sosa and K. Entesari present the “*Design and implementation of a Wireless Medical System Prototype for Implantable Applications*” accomplishing full-system demonstration for the communication with implanted medical devices in the ISM band. The authors I. S. A. Bezzam *et alli* present a key analog design contribution for digital circuits synchronization: the distribution of a system-clock in a resonant fashion. Their paper “*Wide Operating Frequency Resonant Clock and Data Circuits for Switching Power Reductions*” shows the buffering scheme used for reducing the system power budget in the clock distribution network.

The second group of papers in this issue is concerned with digital circuits and systems design, and applications, which are themes invited in the LASCAS calls for papers. Co-authors J. E. Guerrero-Ramirez *et alli* propose a semi-systolic architecture to execute the QR method to compute eigenvalues on symmetric matrices in the paper “*Hardware Design of an Eigensolver Based on the QR Method*”. Their design both in software and in HDL mapped to FPGA shows one order of magnitude speed up of the latter. G. Sanchez and co-authors explore in “*Hardware-Friendly HEVC Motion Estimation: New Algorithms and Efficient VLSI Designs Targeting HD Videos*” the implementation of motion estimation algorithms with respect to their regularity and performance potential in hardware implementation, using the HEVC software and the EPZS algorithm as references. The last paper by W. Jose *et alli* deals with a full design space exploration at the architecture level of

multi-cores dedicated to matrix algebra in the work “*Algorithm-Oriented Design of Efficient Many-Core Architectures applied to Dense Matrix Multiplication*”.

We would like to express our appreciation to the Circuits and Systems Society of the IEEE for sponsoring LASCAS, to Dr. Mohammed Ismail, Editor-in-chief of the Journal, for the opportunity to organize this Special Issue, and to the assistance of Raja Chinnadurai, from the Springer Journal Editorial Office, for the diligent work in the managing functions at their site.

We are grateful to the competent volunteer work of all LASCAS 2013 reviewers and of Special Issue reviewers, who assured a sound technical review of more than 155 papers previously submitted. We hope you appreciate the quality of this Special Issue.

Carlos Silva-Cardenas received the B.Sc. from Universidad Nacional de Ingeniería, Perú; M.Sc. and Ph.D. degrees in Informatic engineering from Autonomous University of Barcelona, Spain. He is a IEEE Senior Member, was the founding chair and current chair of CAS IEEE Peru Section (2007), Chair of IEEE Peru Section (2009–2010), Vice-Chair of IEEE Peru Section (2007–2008; 1995–1997). He is Professor and Director of Master on Telecommunications at the Pontificia

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Eduard Alarcón received the M.Sc. (National award) and Ph.D. degrees (honors) in Electrical Engineering from the Technical University of Catalunya (UPC BarcelonaTech), Spain, in 1995 and 2000, respectively. Since 1995 he has been with the Department of Electronic Engineering at UPC, where he became Associate Professor in 2000. From August 2003 to January 2004, July to August 2006 and July to August 2010 he was a Visiting Professor

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2012, track co-chair of IEEE ISCAS 2007, IEEE MWSCAS07, IEEE ISCAS 2008, ECCTD'09, IEEE MWSCAS09, IEEE ICECS'2009, ESSCIRC 2010, PwrSOC 2010, IEEE MWSCAS12 and TPC member for IEEE WISES 2009, WISES 2010, IEEE COMPEL 2010, IEEE ICECS 2010, IEEE PRIME 2011, ASQED 2011, ICECS 2011, INFOCOM 2011, MoNaCom 2012, LASCAS 2012, PwrSOC 2012, ASQED 2012, IEEE PRIME 2012, IEEE iThings 2012 and CDIO 2013. He served as an Associate Editor of the IEEE Transactions on Circuits and Systems—II: Express briefs (2006–2007) and Associate Editor of the Transactions on Circuits and Systems—I: Regular papers (2006–2012) and currently serves as Associate Editor Elsevier's Nano Communication Networks journal (2009–), Journal of Low Power Electronics (JOLPE) (2011–) and in the Senior Editorial Board of the IEEE Journal on Emerging and Selected Topics in Circuits and Systems (2010–).

Sergio Bampi received the B.Sc in Electronics and the B.Sc. in Physics from the Federal Univ. of Rio Grande do Sul (UFRGS, 1979), and the M.Sc. (1982) and Ph.D. (1986) degrees in electrical engineering from Stanford University. He is a full professor at the Informatics Institute at UFRGS University, coordinator of the Microelectronics Design group. He served from 2005 to 2008 as the Technical Director—CTO of the Microelectronics Center CEITEC in Brazil. Sergio

Bampi served a consulting role for the Brazilian Microelectronics Program and industrial policies related to the electronics industry. Since 1988 he is a Ph.D. advisor and project leader in the Microelectronics and Computer Science Graduate Programs at UFRGS. His research interests are in the areas of CMOS IC design and modeling, dedicated complex architectures and ASICs for image and video processing, nano-MOSFET devices, mixed signal and RF CMOS design, and low power digital methodologies. He has co-authored more than 300 papers in these fields and in MOS devices, circuits, technology and CAD. Sergio Bampi was the President of the Research Funding agency FAPERGS in Brazil (2001–2002), President of the Brazilian Microelectronics Society (2002–2004), and Coordinator of the Graduate Program on Microelectronics at Federal University UFRGS (2003–2007). He chaired IEEE SBCCI (1997, 2005), LASCAS (2013), SBMICRO (1989, 2000) and Ibero-American Microelectronics (1995) conferences, and was track Chair at IEEE ICM, IFIP/IEEE VLSI-SoC, and IEEE ICECS Conferences. He is a member of IEEE, SBMICRO, IEEE Circuits and Systems, IEEE Solid-State Circuits, and Computer Societies.